

1. **(Once Amended)** A substrate having optical and electrical interconnections, comprising:

- a first layer having a first polymeric waveguide formed therein;
- a second layer having a second polymeric waveguide formed therein;
- 5 a first vertical optical coupler formed in said first layer and optically coupled to a first waveguide in said first layer;
- a second vertical optical coupler formed in said second layer and optically coupled to a second waveguide in said layer;
- wherein said first vertical optical coupler is positioned adjacent said second vertical
- 10 optical coupler so that light may be coupled between said first and said second waveguides.

41. **(Once Amended)** An electro-optic module for communicating optical signals between at least two electrical circuit terminals, comprising:

- at least one substrate, wherein each substrate is selected from the group consisting of substrates with passive polymer waveguides, substrates with electro-optic elements
- 5 embedded in a polymer film, substrates having embedded electrical elements, and substrates having passive polymer waveguides and embedded electrical and electro-optic elements;
- a first electrical circuit terminal disposed on one of the substrates, said first electrical circuit terminal coupled to a first integrated circuit chip to receive electrical signals therefrom;
- 10 a second electrical circuit terminal disposed on one of the substrates, said second electrical circuit terminal coupled to a second integrated circuit chip to provide electrical signals thereto;
- optical waveguide means in at least one of the substrates for propagating optical signals;
- 15 optical signal source means in at least one of the substrates for generating optical signals in at least one of the substrates according to the electrical signals received at said first electrical circuit terminal; and
- optical detection means in at least one of the substrates for detecting said optical signals and generating electrical signals therefrom which are coupled to said second